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उत्तराखण्ड UTTARAKHAND

L/791329

कोषाधिकारी (रुइयकी)  
कॉड संख्या 5501  
17 OCT 2014  
जिला हरिद्वार उत्तराखण्ड

**Cost Plus Fixed Term (CPFT) Contract for Research and Development (R&D) under the Grand Challenges Initiative India (GCI India)**

*Ram Singh*  
This Cost Plus Fixed Term (CPFT) Contract hereinafter referred to as "Contract" is made on this 29 day of Oct, 2014 (Effective Date) at New Delhi BY and BETWEEN the Biotechnology Industry Research Assistance Council, a Government of India Enterprise incorporated under the Indian Companies Act 2013, having its office at **1<sup>st</sup> Floor, MTNL Building, 9, CGO Complex, Lodhi Road, New Delhi - 110003**, hereinafter referred to as "BIRAC" (which expression shall wherever the context so admits include its successors and assignees) of the **First Part**

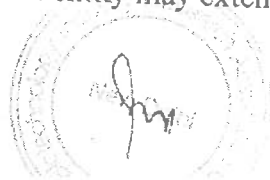
AND

Indian Institute of Technology Roorkee, having its Office at Roorkee, Uttarakhand-247667, hereinafter referred to as the "Lead Organisation" (which expression shall wherever the context so admits include its successors in interest, liquidators, administrators and permitted assignees) of the **Second Part**

WHEREAS all the parts are hereinafter referred to as "Parties";

WHEREAS Department of Biotechnology (DBT) and Bill & Melinda Gates Foundation (BMGF) have launched mission-directed research funding initiative to support health research and innovation in India and provided financial support for BIRAC's Request for Proposal (RFP) entitled "Achieving healthy growth through Agriculture and Nutrition" / "Reinvent The Toilet Challenge". Any other likeminded philanthropic Governmental or Non-Governmental entity may extend their support to the aforesaid initiative during its pendency.

*Sudipti Saha*





उत्तराखण्ड UTTARAKHAND

L 791331

कोषाधिकारी (ठंडकी)  
मोह संख्या 5501  
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**Cost Plus Fixed Term (CPFT) Contract for Research and Development (R&D) under the Grand Challenges Initiative India (GCI India)**

WHEREAS BMGF and DBT along with other supporters of the above initiative have entrusted Biotechnology Industry Research Assistance Council, a Government of India Enterprise setup as Industry-Academia interphase entity of the Department of Biotechnology, Ministry of Science and Technology, Government of India with the Implementation of the Grand Challenges India Program (hereinafter referred to as "GCI").

WHEREAS the Lead Organisation has conceived a Project entitled "An Enterprise-Driven High Quality Community Toilet System Sustaining on Commercial Values Generated by Black Soldier Fly Larvae Grown on Human Faeces and by Fertilizer Derived from Urine" and has submitted a proposal with amendments (hereinafter called the "Project") under GCI as per Annexure 1;

WHEREAS the proposal has been approved for support under GCI and the Lead Organisation is called to perform on payment of an amount of Rs 51.2 lakhs on the terms and conditions contained hereinafter in this Contract.

AND WHEREAS the Lead Organisation represents that it is willing and able to perform in accordance with the terms of this Contract;

Sudipta Saha



**Cost Plus Fixed Term (CPFT) Contract for Research and Development (R&D) under  
the Grand Challenges Initiative India (GCI India)**

All Annexure(s) to this Contract shall be integral part of this Contract.

NOW THEREFORE, in consideration of the promises and mutual covenants hereinafter contained, the Parties hereto agree as follows:

**1. RESPONSIBILITIES OF THE LEAD ORGANISATION**

- a) The Lead Organisation shall:
- i. discharge its duties, responsibilities and execute its activities as set out in **Annexure 1** and shall conform to the specified objectives, outputs, milestones, and targets therein;
  - ii. Perform the Project activities to the extent as agreed to, through its own resources, as per details given in **Annexure 1**.
  - iii. Submit periodic progress report to BIRAC as per the Project milestones, details of services involved in performing the Project activities and statements of account duly audited and/or certified by a chartered accountant for the expenditure incurred towards the Project;
  - iv. submit the Utilization Certificate (UC) and Statement of Expenditure (SE) duly audited and/or certified by The Finance for the expenditure incurred towards the Project for every half year period, ending 30th September and 31st March, to BIRAC, within a month of closure of the accounts for the respective half year, in the format provided by BIRAC;
  - v. Permit BIRAC access to the premises, during regular business hours, where the Project is being/shall be implemented and provide all information and produce or make available the concerned records for inspection and monitoring of the Project activity, as required by BIRAC;
  - vi. Obtain all the necessary requisite approvals, clearance certificates, permissions and licenses from the Government/local authorities for conducting its activities/operations in connection with the Project;
  - vii. Keep the cost disbursed for the Project in an interest bearing account in the name of the Lead Organisation with a Scheduled Bank (as defined under the RBI Act, 1934), the withdrawals and payments from which account shall be subject to verification by BIRAC.
  - viii. The Lead Organisation shall not entrust the implementation of the Project to another agency unless such entrustment is in accordance with the Project sanction;
  - ix. Abide by the decisions of BIRAC to modify the objectives, outputs, milestones, targets, Project Cost as also the foreclosure of the Project or any of its components as may be arrived at after mutual discussion;

*Sudipta Saha*



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- x. Acknowledge the assistance under GCI while publishing or presenting in any manner the details of the Project, its progress or its success along with the "Disclaimer" that reference therein to any specific commercial product, process, views or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or assuming liability of any sort by the DBT/BIRAC.
- b) In case the Project has other co-recipient(s) of the GCI support, then, the Lead Organisation undertakes that:
- i. It shall enter into a Collaborative Research MOU (Memorandum of Understanding) with all Project implementers including the Non- Indian Cost Recipients/Collaborators on the Project activities.
  - ii. It shall assert implementation of the governing provisions of such MoU that will in turn be cognate to the present Contract.
  - iii. It shall, as the Lead Organization of the Project, be responsible for effecting the specified objectives, outputs, milestones, and targets by the co-recipient(s) of the GCI support.
- c) The Lead Organisation warrants that
- i. It shall not at any time within the Project Duration, without the written consent of BIRAC, enter into any Contract or arrangement with any third party, national or international that can affect the obligations undertaken under the Project or Contract;
  - ii. It is under no contractual restrictions or legal disqualifications or any other obligations which would prohibit the Lead Organisation from entering into this Contract or which will interfere with the execution of this Contract; and
  - iii. Each and every one of the statements and particulars herein contained in this Contract and in the relevant and supporting documents to this Contract are correct.
- d) The Lead Organisation acknowledges and agrees that:
- i. The duties, responsibilities and functions assigned or entrusted to it as specified in the Project shall be deemed to be the duties, responsibilities and functions assigned and entrusted to it under this Contract and unless for reasons beyond control under normal circumstances, any undue delay, failure or default in performance of the duties, responsibilities and functions as specified in the Project shall be deemed to be a default under this Contract;
  - ii. It shall, at all times, indemnify and keep indemnified BIRAC against any claims or suits in respect of any losses, damages or compensation payable in

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## Cost Plus Fixed Term (CPFT) Contract for Research and Development (R&D) under the Grand Challenges Initiative India (GCI India)

- consequences of any accident, death or injury sustained by the employees of the Lead Organisation or by any other third party resulting from or by any act, omission or operation conducted by or on its behalf;
- iii. It shall, at all times, indemnify and keep indemnified BIRAC against all claims/damages etc. by any infringement of any Intellectual Property Rights (IPR) while carrying out its responsibilities/work under the Project and this Contract; and
  - iv. BIRAC shall reserve the right to reconsider further release of Project Cost, governance of the New Intellectual Property or enforce return of the Project Cost in such circumstances of change of control as mentioned the following paragraph;

It shall notify BIRAC promptly of any material change in its incorporation status, Project Coordinator, implementation site, receipt of notice of any suit or other legal process intended to be filed or initiated against the Lead Organisation affecting the title to the properties of the Lead Organisation or any such change that would impact on performance of its obligations under the Project and this Contract.

## 2. FINANCIAL ARRANGEMENTS

The financial arrangements under this Contract are as here under

- i. In full consideration for the performance of the obligations of the Project, Rs. 51.2 lakhs (Rupees fifty one lakhs and twenty thousand only) is sanctioned to the Lead Organisation on the terms and conditions detailed in this Contract (Project Cost).
- ii. The detailed progress-wise and head-wise breakup of the Project Cost and the corresponding timeline terms are given in **Annexure 2**. All the Project Cost will be released through BIRAC. The Lead Organisation shall submit the first invoice at the beginning of the Contract period and the first payment of 30% of the total Project Cost shall be made upon receipt of an invoice, to allow for start-up costs. Further release of Project Cost shall be in response to a properly submitted invoice subject to satisfactory progress against the objectives, outputs, milestones and targets specified in the Project which progress shall be determined by BIRAC and on submission of Progress Report and audited/certified statements of accounts as provided for in **Clause 1(a) (iii) & (iv)**;
- iii. The Lead Organisation shall ensure that the cost amount released for the Project are actually utilized only for the purposes of the Project and as expressly provided for in this Contract. Re-appropriation of Project Cost from one budget head to another shall not be effected without the specific written approval of BIRAC;

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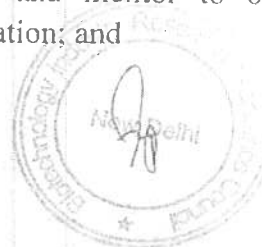
- iv. The Lead Organisation shall refund such part of Project Cost disbursed to it that remains unutilized with it upon completion of all the responsibilities, duties and functions specified in connection with the Project, within one month of such completion, to BIRAC along with detailed accounts of the funds received and utilized and of the unutilized balance returned;
- v. The Lead Organisation at its own cost, shall take adequate care to maintain the capital assets acquired for the Project under GCI;
- vi. The Project Fund sanctioned for the non-Indian co-recipient(s) will be released by BMGF on behalf of BIRAC after BIRAC has determined that the non-Indian co-recipient has made satisfactory progress against the objectives, outputs, milestones and targets specified in the Project by BIRAC (and has so instructed BMGF) and on submission of Progress Report and audited/certified statements of accounts; and
- vii. The provision of Project Cost by BIRAC does not create any liability, explicit or implicit, on DBT/BMGF/BIRAC in respect of the manpower engaged in the Project.
- viii. The Lead Organisation may not make any statement or otherwise imply to donors, investors, media or the general public that it is a direct grantee of BMGF.

**3. PROJECT MANAGEMENT TEAM**

A Project Management Team (PMT) comprising of eminent experts from the relevant field(s) will be constituted by BIRAC to monitor the progress of the objective(s) of the Project. The functions of the PMT shall be as follows:

- i. To monitor the progress of the Project in conformity with the outputs, milestones, targets objectives and other terms and conditions as contained in the Contract.
- ii. To keep track of funding from any other source for the Project.
- iii. To assess continuous eligibility, ability and sustenance status of the Project Cost recipient as per the GCI guidelines and the conditions of this Contract.
- iv. Based on the foregoing, to assess and recommend:
  - a. The release of next installment or part release thereof by the BIRAC.
  - b. revision of Project Duration
  - c. closing, dropping or modifying any of the components of the Project, within the overall approved objectives, budget and time-frame,
  - d. inclusion of additional industrial/institutional partner(s), if the Lead Organisation requests involvement of such partner(s), in the overall interest of the Project; and
  - e. Revision of the Project Cost.
- v. To advise on issues related to securing of IPR and mentor to overcome any technological problem faced in the Project implementation; and

*Sudipta Saha*



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- vi. To advise on any other matter as referred to it by BIRAC and/or otherwise reasonably necessary for effective discharge of its duties and/or achievement of aims and objectives of GCI.

**4. RESULTS OF THE PROJECT**

- i. The deliverables from the Project are defined and are included in the Project details at **Annexure 1**.
- ii. It is the responsibility of the Lead Organisation to protect the New Intellectual Property (New IP). It shall bear the expenditure involved in protecting the New IP. For the purpose of this Contract, New IP means intellectual property generated during the conduct of the Project by the Lead Organisation, but excluding the intellectual property generated by the Lead Organisation before execution of this Contract as set out in **Annexure 3** and any IP generated outside the scope of this Contract even during the term of this Contract.
- iii. New IP shall be governed in accordance with the GCI guidelines and such specific IP governance framework agreed to as part of Project Sanction. In case the Project has non-Indian co-recipient(s) of the GCI support, then, the Lead Organisation as the Lead Organization and the Co-recipient(s) shall execute the IP governance framework on mutually accepted conditions that will include the principles of Global Access provided below as a precondition for release of Project cost. The New IP shall not be assigned or transferred to any third party directly or indirectly without priorwritten consent from BIRAC.

**5. PROJECT DURATION**

The Lead Organisation shall complete the Project within the stipulated period of eighteen (18) months from the execution of this Contract ("Project Duration") i.e. on or before April, 2016 subject to the Change Order(s) issued by the BIRAC from time to time under this Clause.

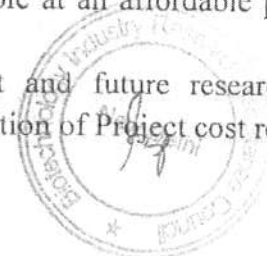
**6. GLOBAL ACCESS**

The Lead Organisation agrees to conduct and manage the Project and the resulting products, services, processes, technologies, materials, software, data or other innovations (collectively, "Project Developments") and any IP that arises (New IP) in the manner that ensures "Global Access." Global Access requires that

1. The knowledge and information gained from the Project be promptly and broadly disseminated
2. The Funded Development is made available and accessible at an affordable price to people most in need within developing country.

In this regard, ensuring Global Access in all present and future research and development agreements in a suitable form will be a condition of Project cost release.

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**7. CONFIDENTIALITY**

- i. During the tenure of the Contract, all Parties, undertake to maintain strict confidentiality and refrain from disclosure thereof, of all or any part of the information and data exchanged/generated from the Project under this Contract for any purpose other than purposes in accordance with this Contract. It shall be the responsibility of the Parties to ensure maintenance of such confidentiality including on behalf of their employees, representatives and associates involved in the Project.
- ii. The Parties shall not have any obligation of confidentiality with respect to any information that:
  - a. is in the public domain by use and/or publication at the time of its disclosure by the disclosing party; or
  - b. was already in possession of the recipient prior to receipt from the disclosing party; or
  - c. is properly obtained by the recipient from a third party with a valid right to disclose such information and such third party is not under confidentiality obligation to the disclosing party; or
  - d. was disclosed to any third party on a non-confidential basis prior to commencement of the Project; or
  - e. was developed by the recipient, as established by acceptable written record, independently of the disclosure of information by the disclosing party; or
  - f. is required by public authority, by law or decree.

**8. FORECLOSURE AND TERMINATION**

- i. In case, during the Project Duration, it is found that the Project or any Project component is not likely to lead to successful completion, BIRAC may decide to foreclose the Project or the Project component as warranted. The decision of the BIRAC shall be final in all respects. The Lead Organisation shall immediately refund any Project Cost unutilized out of BIRAC's disbursements to BIRAC, BIRAC, at its discretion, allow deduction of, the future committed expenses to third party vendors on pro-rata basis according to the quantum of BIRAC's funding. The Lead Organisation shall submit detailed accounts of funds received, utilized and unutilized. However, BIRAC may by a specific written order, prescribe a repayment schedule for the amount outstanding. If the Lead Organisation likes to continue the Project at its own cost, it would be able to do so without restrictions from BIRAC after complying with these provisions.
- ii. The Lead Organisation may, before the completion of the Project, terminate this Contract by giving three months' notice in writing to BIRAC. BIRAC may also terminate this Contract by written notice in the event of "the Lead Organisation"

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committing breach of any term of this Contract and either not rectifying it to the satisfaction of BIRAC or not satisfying BIRAC about its inevitability within a specified period. In the event of termination of the Contract for any reason whatsoever, no further disbursement shall be made by BIRAC and the Lead Organisation shall be liable to return immediately and Project Cos talready availed of from BIRAC within 30 (thirty) days of issue of such termination. In case of failure to repay, without prejudice to any other rights under this Contract, the amount can be recovered by initiating any procedure available in Law.

**9. FORCE MAJEURE**

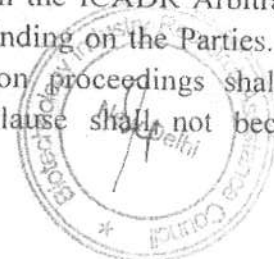
The Parties shall not be held responsible for non-fulfillment of their respective obligations in successful completion of the Project under this Contract due to the exigency of one or more *force majeure* events such as but not limited to acts of God, war, flood, earthquakes, strikes not confined to the premises of the Party, lockouts beyond the control of the Party claiming *force majeure*, epidemics, riots, civil commotion etc. lying beyond the reasonable control of and not brought about at the instance of the Party claiming to be affected by such event and which has caused the non-performance or delay in performance; provided on the occurrence and cessation of any such event the Party affected has given a notice in writing to the other Party within one month of such occurrence or cessation. If the *force majeure* conditions continue beyond six months, the Parties shall jointly decide about the future course of action on the Project. The validity of the claim of *force majeure* shall be determined by BIRAC after due enquiry and the decision of BIRAC in this regard shall be final.

**10. DISPUTE RESOLUTION AND ARBITRATION**

In the event of any dispute or difference between the Parties hereto upon or in relation to or in connection with this Contract, such dispute or difference, shall be resolved amicably and in good faith by mutual consultation.

If such resolution is not possible, then the unresolved dispute or difference whatsoever arising between the Parties out of or relation to the construction, meaning, scope, operation or effect of this Contract or the validity the breach thereof or in respect of any defined legal relationship associated therewith or derived there from dispute shall be submitted for arbitration to International Center for Alternate Dispute Resolution (ICADR), an autonomous organization working under the aegis of the Ministry of Law & Justice, Department of Legal Affairs, Government of India. The Authority to appoint the arbitrator(s) shall be the ICADR. The Arbitration under this Clause and provision of administrative services by ICADR shall be in accordance with the ICADR Arbitration Rules, 1996. The award made in pursuance thereof shall be binding on the Parties. The venue of arbitration shall be New Delhi and the arbitration proceedings shall be conducted in English Language. The provision of this Clause shall not become

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inoperative notwithstanding the Contract expiring or ceasing to exist or being terminated or foreclosed.

**11. EFFECTIVE DATE AND TENURE OF THE CONTRACT**

- i. The Contract shall be effective from the date of its signing by both the Parties. In the event the Parties affix their signatures to this Contract on separate dates, the Contract shall be effective from the date on which the last set of signature is affixed thereto.
- ii. The Contract shall remain in force for whichever of these is the longest time unless foreclosed or terminated sooner: *Handwritten signature*
  - a. For 18 months from the above Effective Date;
  - b. As long as any part of the Project Cost remains unspent; or
  - c. For as long as any monitoring or recording or IP governance is required under this Contract or any relevant laws and regulations.
- iii. The effect of this contract can be extended in writing if agreed to by all the Parties.
- iv. Two copies of the Contract shall be signed by each of the Parties and one copy each shall remain in the custody of each Party.
- v. Provisions of **Clause 4** and **Clause 6** of this Contract as also any other Contract arrived at between the Parties hereto regarding rights in the intellectual property and Global Access shall survive expiry or termination of the Contract.
- vi. Any failure or delay on the part of BIRAC to exercise any right or power under the Contract shall not operate as waiver thereof.

**12. AMENDMENTS TO THE CONTRACT**

Unless specifically included as a part of the Contract Documents, any and all prior negotiations and writings of every kind between the Parties hereto concerning this Contract or the Work described herein are superseded and supplanted by this Contract. Any changes to the provisions of this Contract made following the execution of this Contract, including changes to the Contract Documents, shall be made in writing by way of an executed Change Order. The modifications / changes shall be effective from the date on which they are made / executed unless otherwise agreed to.

**13. SEVERABILITY**

In case any one or more of the provisions or parts of a provision contained in this Contract shall, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision or part of a provision of this Contract; and this Contract shall, to the fullest extent lawful, be construed as if such invalid or illegal or unenforceable provision, or part of a provision, had never been contained herein.

*Handwritten signature: Sudipti Saha*



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**14. NOTICES AND JURISDICTION**

- i. All notices and other communications required to be served on the Lead Organisation including for violation of the terms of this Contract shall be considered to be duly served if the same shall have been delivered by registered mail to the Lead Organisation at its address as stated below.

**The Dean (Sponsored Research and Industrial Consultancy)  
Indian Institute of Technology Roorkee  
Roorkee, Uttarakhand - 247667, India.**

Similarly, any notice to be given to BIRAC shall be considered as duly served if the same shall have been delivered by registered mail to BIRAC at its address in New Delhi as stated below:

**The Managing Director,  
Biotechnology Industry Research Assistance Council,  
1<sup>st</sup> Floor, MTNL Building  
9, CGO Complex, Lodhi Road,  
New Delhi - 110003**

- ii. Subject to the provisions of **Clause 10** hereof, the Courts at New Delhi shall have exclusive jurisdiction in all matters concerning this Contract including any matter arising out of the arbitration proceedings or any award made therein.

**15. NO JOINT VENTURE**

Nothing contained in this Contract will be construed as creating a joint venture, agency, partnership or employment relationship between the Parties hereto, nor will any Party have the right, power or authority to create any obligation or duty, express or implied, on behalf of the other Party.

**16. GOVERNING LAW**


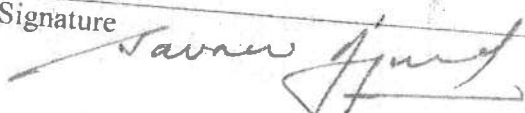
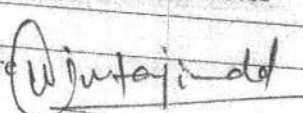
This Contract shall be governed and interpreted in accordance with the laws of India.  
IN WITNESS WHEREOF the Parties hereto through its duly authorized representatives  
have signed this Contract on the day, month and year mentioned hereinbefore.

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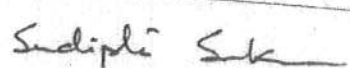

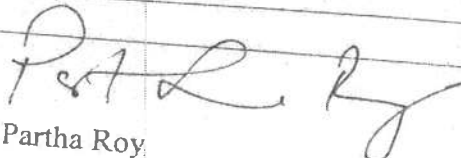


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Parties

For and on behalf of BIRAC	
Signature 	
Name DR. RENU SWARUP	
Designation MD, BIRAC	
Lead Organisation Common Seal	Managing Director Biotechnology Industry Research Assistance Council (A Government of India Enterprise) 1st Floor, MTNL Building, 9, CGO Complex Lodhi Road, New Delhi-110003
Witnesses	
Signature 	Signature 
Name SAURAV ASORWAL	Name DR. VINITA JINDAL
Address 9, CGO Complex Delhi-03	Address 9, CGO COMPLEX DELHI - 03

For and on behalf of Indian Institute of Technology Roorkee, "the Lead Organisation" duly authorized vide Communication dated 17.10.2014

Signature 	
Name Dr. Sudipta Sarkar	
Designation Assistant Professor, Department of Civil Engineering	
Official Seal	Department of Civil Engineering Indian Institute of Technology Roorkee Roorkee - 247667, Uttarakhand
Witnesses	
Signature 	Signature 
Name Prof. Absar A kazmi	Name Prof. Partha Roy
Address Department of Civil Engineering, IIT Roorkee	Address: Department of Biotechnology, IIT Roorkee

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Annexure 1

Complete Project document with amendments (as mutually agreed between BIRAC and the Lead Organisation) including work programme/plan shall have to be specifically mentioned.

(This document should be bound as part of the Contract and labeled as Annexure 1 and should not be submitted as a separate document.)

Proposal Reference No.: BIRAC/GCI/0066/02/13-RTTC

PROPOSAL DETAILS

1. Executive Summary (Please provide a brief executive summary that captures the core idea of the project and its potential impact:)

A decentralized sanitation system can prove to be useful for solving the overwhelming problem of open defecation in the developing countries. In this project, we aim to develop a sustainable technical solution which shall lead to successful development of an enterprise-based sanitation system in which every stakeholder shall get benefitted. Provision of affordable, quality toilets offering high degree of user-comfort shall ensure their continuous operation and maintenance. Hence, there is a need to develop a self-sustained enterprise-driven system to support all activities related to the whole sanitation system. In order that the enterprises sustain over time, it is necessary to make them profitable, by extracting marketable values out of the human excreta. Our proposed solution attempts to segregate the liquid and solid excreta and to recover values from them. We propose to use Black Soldier Fly Larvae (BSFL) to consume the human fecal matter and other bodily wastes. Mature BSFL are good source of fat, protein and chitin. Harvested BSFL after drying and pulverization can be an effective food for farmed fish as well as animals. Further, there is a scope that BSFL can be processed to extract essential oil, biodiesel, protein-rich fish- and animal-feed, chitin and other valuable commercial products. In the present proposal, as noted by DBT and Gates foundation, our scope is limited to the research related to the proof of concept that BSF larvae can successfully treat the human fecal matter. More specifically, we shall look into the kinetics and growth of BSFL, artificial mating and mass hatching and life-cycle events for different types of substrates with varied proportions of human faeces, under different environmental conditions. We also want to look into the potential market for the valuable by-products that can be produced from the harvested larvae.

2. Project Goals and Strategic Importance  
(Please provide a Goals and the Strategic Importance of the project and its potential impact. Where appropriate, the following questions should be addressed as part of the narrative in this section:)

- What are the projects ultimate goals and outcomes?
- What is the strategic importance of these goals? explicitly describe how the proposed

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innovations in sanitation technology will address the lack of adequate sanitation in India in a sustainable manner?

- What are the key outcomes indicating the new technologies that hold significant value as a resource for the wider scientific and engineering community.
- Indicate the ability of the proposed technology to eliminate all known pathogens including helminths

Our proposed solution to stop the open defecation practice in India stands on the following basic premise:

1. Every human being has the right to have access to quality sanitation facilities.
2. Human excreta, when not diluted with water, has enough calorific value and nutrient value which can be extracted using a proper technology.
3. An intelligently designed business process/enterprise can make the new sanitation system self sustainable by supporting the whole operation and maintenance needs of sanitation system in rural India.

Our proposed solution has two components:

- a) High-quality community toilets: Ergonomically designed and culturally compatible community-level diversion toilets shall help separating three streams: undiluted urine, faeces, and water used for toilet flushing and personal hygiene. The urine shall be converted to onsite struvite crystals. Solid waste shall get consumed by Black Soldier Fly Larvae (BSFL) in another on-site reactor. The water in the system shall be recovered and recycled for toilet flushing purposes. The pathogens including helminths in the faeces are expected to get destroyed within the gut channel of BSF larvae.
- b) Product REcovery Plant (PREP): At a PREP facility, one for every 20-50 community toilet systems, there will be further downstream processing of the resources recovered at the community-toilet level, to recover products with high market value.

In order to make the process viable, we need to carry out further research to develop different components of the facilities, process and business model. In view of this, the project has the following ultimate goals.

- Goal 1: Improving the indigenously available urine diverting toilet (UDT) available in India to incorporate vacuum flushing arrangement and non-stick surface.
- Goal 2: Investigate, develop and optimize the processes for onsite transformation of urine, solid wastes and recycling and recovery of used water.
- Goal 3: Optimizing the conversion of urine in struvite and developing control parameters for BSF Farming explicitly for Indian conditions.
- Goal 4: Identify commercially important end products and develop processes to recover the end products from resources recovered at the community toilet.
- Goal 5: Examine the revenue generation potential from in-toilet advertising in order to add to the sustainability of the proposed system.

The whole process is summarized in the process flow diagram titled "Process Flow Diagram of Enterprise-Driven Community Toilet System" (Figures-1 and 2) was separately uploaded as a part of the original proposal. The same is appended here also.

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In view of the present project being awarded in "proof-of-concept mode", the short term goals under the present phase of the project are as follow:

- a) Establishing a proof that black fly soldier fly can be used effectively in Indian conditions for transforming the human faeces into biomass by its larvae, and
- b) Identifying and finding the market value of commercially important end products that can be recovered from the mature BSF larvae.

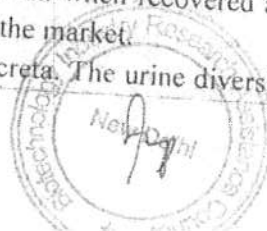
Eradication of open defecation is by itself the biggest social impact by saving millions of lives, livelihood and future prosperity. Following our approach, the whole sanitation business can be turned into an enterprise-based system where bringing the people to the toilet is essential for income generation. This symbiotic relationship shall promote the installation and maintenance of high-quality toilets as well as help making it sustainable.

The social enterprise that shall potentially be evolved shall provide scores of direct employments. There will be a surge of innovations and newer products in the market, opening up doors for more indirect employments in the ancillary business sectors. The social impact of the project shall be the new beginning of a movement supported by enterprise-driven business process through which the open defecation will be eradicated in India forever.

3. Core Innovation of Proposed Project
- (Please describe the Core Innovation of the proposed project. Where appropriate, the following questions should be addressed as part of the narrative in this section:)
- What is the scientific basis for the innovation?
  - What is the comparative advantage of the proposed innovation compared to currently accepted methods?
  - For Proof of Concept: What is the potential for this innovation to be brought to scale?
  - For Scale-up proposals: How will the pilot project demonstrate the ability to scale to the broader population in a sustainable manner?
  - Describe the next step after successful completion of this phase. What do you envision to be the key next step to making impact with this innovation?

Our proposed solution to the overwhelming problem of open defecation in India is to identify, develop and validate a set of processes that would generate values from the whole system comprising of sanitation and processing of waste for resource recovery. Countries in Asia and Africa, hold a great potential to implement innovative technologies well integrated with improvements in sanitation coverage. For example, globally, there is a huge demand for the nutrients, especially phosphorus, for agriculture and aquaculture operations. It was estimated that in 2009, the phosphorus available from urine and feces, if recovered fully, would have been enough to supply 22% of the total global phosphorus demand. Apart from nutrients, the human feces are a good source of fat and protein, which when recovered and transformed into innovative end products can find out their value in the market. There have been previous efforts to generate values from human excreta. The urine diversion

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and recovery of phosphate and other nutrients in the form of a rich concentrated solution/or in the form of solid fertilizer such as struvite has been extensively researched in Eawag. Human feces (or wastewater produced thereof) have been tried for the production of bio-gas, manures, and even, electricity. However, the processes proved limited viability in the field. Here we propose to use black soldier fly larvae which would *consume* the human feces. The mature BSFL or pre-pupae will be further processed in a centralized Product REcovery Plant (PREP) to recover the values contained in them.

The main innovation in this project lies in the intelligent integration of different components/sub-processes in the whole sanitation system for which there are fully or partially developed knowledge/products available in open literatures/market. The integration gives rise to a viable social business plan where every stakeholder is benefitted. Please refer to the process flow diagram (figure-1 and figure-2) uploaded as part of this proposal.

The broad areas where we shall impart innovation in this phase of the project are as follows:

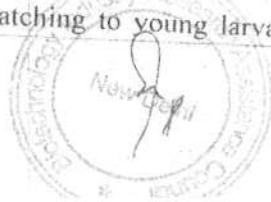
a). **Innovation in the functional design of the toilet:** In order to make the new process viable, the recovery of the values from the excreta needs to be maximized. To fulfill this objective, it is necessary segregate the urine, feces and wash- and flushing water at source by using urine diverting toilet (UDT) blocks in the community toilets. It is required to investigate their design in accordance to local cultural acceptances and also to introduce modifications so that the water requirement for flushing can be lowered by using a combination of vacuum flushing system and non-stick surface coating.

b) **Innovation in the process design:** On-site fast processing of urine, solid waste and water used for washing and flushing purposes is the heart of the whole system for keeping the footprint as small as possible. Contrary to the conventional approach of stabilization using microbial community, which is a slow process where the organics are *degraded* to simpler products using enzymes, we employ two pronged approach here: a) separate collection of urine, and recover the nutrients as struvite, a slow-release commercially viable fertilizer, and using the remains as a nutritional supplement to irrigation water; b) Use of black soldier fly larvae (BSFL) to *consume* the solid- and bodily waste.

Marketability of struvite depends on chemical composition and degree of granulation for easier dosage and handling. An onsite reactor at the toilet block shall generate crystals of struvite which shall be further value-added at a granulation plant in PREP and shall be packaged for market. Further research needs are a) kinetics of nucleation and crystal growth of struvite b) reactor design and optimization, c) granulation plant design and, d) characterizing the urine-remains for use as a nitrogen-containing nutritional supplement to irrigation water.

The BSFL will be used in an on-site reactor where young larvae shall be fed from one side, grown on the feces collected inside the reactor and the mature pre-pupae are collected from the other end. The mature BSF pre-pupae shall be transported to the central PREP facility where one part is allowed to grow in flies, lay eggs for further hatching to young larvae.

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Remaining BSF pre-pupae shall be processed in the PREP for value recovery. The composition of whole unseparated prepupae grown on organic waste, is about 42% protein, 35% lipid, 5% calcium, 1.5% phosphorus, 3.4% lysine, and 1% methionine/cystine. BSF pre-pupae, when dried and milled, have been found to be a high quality fishmeal replacement or supplement in aquaculture operations, for which there is a huge market in India as well as in outside world. The lipid can be expelled and converted into bio-diesel; the shell of the dead larvae can be utilized to produce chitin, a bio-polymer, extensively used in the medicine industry. The lipids contain about 54% lauric acid which has antimicrobial properties. A refined animal protein, obtained after removal of the oil and chitin from SF, may have significantly greater economic value than the original dried SF.

The further research needs are: a) kinetics of growth of BSFL, their efficiency in consuming human waste, in removal of pathogens, b) design and optimization of BSFL reactor, c) design of facilities/devices for downstream processing of mature BSFL for extraction of valuable products.

The water used in the toilets shall be recovered and reused in the process again through a set of processes including anaerobic membrane bioreactor, UV sterilization, solar distillation, etc.

c) **Innovation in developing sustainable business process:** A significant amount of further revenue can be generated using the toilet itself which is the best place for running business commercials/ advertisements that due to the lonely state of an individual inside a toilet, would attract the best attention.

We are looking forward to conducting research on the proof-of-concept and the process development for the whole system. The next phase of the project shall be on prototype development and testing and validating the community toilet systems and PREP facility in the field.

In the present phase of the proof of concept project, the aims are: a) to observe the kinetics of growth of BSF larvae; b) to study and optimize artificial mating of black soldier fly and hatching of the eggs; c) to study the efficiency of BSF larvae in consuming human waste and removal of pathogens.

4. Overall Approach to Scientific Project Execution (Please describe the Overall Approach to executing the proposed project. Where appropriate, the following questions should be addressed as part of the narrative in this section:.)
- Describe the overall approach for the scientific execution of the project
  - Provide a brief summary of the collaborative nature of the proposed project and how it will build multi-disciplinary research capability
  - Mention the design and methods to be used with respect to experimental plan, proposed assays and systems for analysis.
  - What are the possible risk factors, including scientific and regulatory issues, and how do you propose to mitigate them?
  - What are the scientific and technological approaches being employed to solve the stated problem?

The whole idea here is to provide economic sustainability to a high-quality sanitation system

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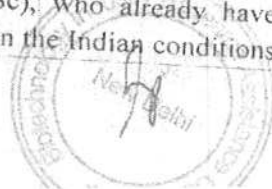
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which would help to bring people to the community toilets, thereby eliminating the menace of open-defecation. In this project, the scientific challenges are to identify, improvise and develop processes to stabilize the human excreta to convert it into products with high market value.

Human urine and feces have different characteristics and shall be collected separately to effectively reap the value out of it. The separation shall be done using a urine diverting toilet (UDT). UDTs are available in India. However, they need improvisation and cost-optimization so that they can adapt to the other requirements of sustainable design, such as, local cultural acceptance, personal comfort, ergonomically suitable odorless design, ensuring minimum water requirements during flushing, etc. The design improvisation efforts require multidisciplinary approach with contributions of experts from architecture, planning and designing, environmental engineering, and mechanical engineering. Separate collection of urine allows for recovering valuable nutrients such as nitrogen, phosphorus, potassium or sulphur which can be used as fertiliser in agriculture. Recovering nutrients from urine in small décentralised reactors on site shall produce struvite, a valuable fertiliser, shall promote entrepreneurship and reduces pollution of water resources. Although the technology for making struvite crystals are well known, the scientific challenge here is to design an optimum reactor at the community toilet for struvite precipitation from urine, so that the rich elixir containing struvite can be transported to the Product Recovery Plant (PREP) for further purification, granulation and drying for better value addition. In order to optimize the processes and design the reactors both at the community toilet as well as at PREP, we need to study the kinetics of nucleation and crystal formation, and granulation extensively at different operating parameters. The study requires experts from environmental, chemical, mechanical engineering as well as biology/biotechnology.

The most important part of the project is the transformation of the human faeces and other bodily wastes using black soldier fly larvae (BSFL) which actually consume the solid waste. BSFLs have been extensively used in quick consumption of organic wastes, poultry and swine manures, however, never been tested for human faeces. Specifically, there is a need for further research to find out or develop procedures for the following : a) Investigation of life-cycle of the BSF in different climatic conditions for maximum egg-laying followed by procedures for mass production of larvae through artificial hatching; Artificial hatching procedures need to be optimized keeping in view of the limited availability of resources in the rural/semi-urban set up; b) adaptability of the BSFL at different climatic condition prevailing across India; c) the rate of growth of the BSFL at the different environmental conditions such as temperature, moisture content, etc. vis-a-vis the human faeces consumption rate; d) the effects of addition of other solid waste, bodily waste or organic waste on the rate of stabilization of human faeces by BSFL; e) optimize the design of larval digesters for continuous production of pre-pupae, separation/isolation and collection systems, f) transportation logistics for young and mature larvae from PREP to community toilet and back, respectively. The study here involves close coordination between the experts of Biology/Biotechnology, Chemical, Mechanical and Environmental Engineering. We have also identified a collaborator, M/s Freshrooms Life Sciences (FLSc), who already have experience of conducting some preliminary research of growing BSF in the Indian conditions

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on different types of substrates.  
Major revenue earning is targeted through conversion of the BSF pre-pupae into valuable end products. There are evidences that dried and milled pre-pupae are excellent fish-feeds. However, apart from protein, it still contains significant amount of fat and polysaccharide-like shell material (chitin), which reduce the protein value of the meal per unit weight basis. We would like to investigate further options to recover more specialized end products that would fetch better values. Available data in the open literature indicates there is a potential to extract fat/oil from the pre-pupae. There is evidence that the oil can be converted to bio-diesel through trans-esterification. A by-product of bio-diesel production is glycerine which has a substantial market value. Besides, the proximate analysis of fat shows a considerable presence of Lauric acid, which has significant medicinal value. However, given the limited data on fat extraction from insects in a commercial setting, further research and testing is required to realize the proposed solution and ensure it is scalable and cost effective. The cuticle or skin material, contains chitin which when recovered can have many uses and significant value in several. We intend to investigate different ways for extraction of chitin including biochemical pathways using lactic acid fermentation, so that the protein residue can be converted to high efficiency fish feed. The ultimate residues including dead BSF can be ultimately composted to make fertilizers. The investigation in the downstream processing requires involvement from experts from biotechnology, chemical, environmental as well as mechanical engineering.

We want to set up in the premises of Indian Institute of Technology Roorkee two UDTs from where source separated urine, faeces and water shall be collected regularly and be brought to the laboratory for investigation of different processes related to the project objectives. The laboratory shall have scaled-down reactors and facilities for struvite production, BSFL rearing, BSF processing and also artificial hatching facilities for BSF eggs. We shall also perform the full chemical assays of the oils, fats and protein available from the BSF pre-pupae to explore possibilities of separating more valuable products and byproducts. We shall also use the composting facility available in the laboratory to explore the possibility of turning the ultimate residues into soil amendments. The samples of wastewater collected from the toilet shall be subjected to membrane bioreactor/anaerobic reactors in the laboratory for assessing their recovery, followed by UV based sterilization to investigate the pathogen removal/deactivation. The laboratory shall be equipped with measures for bio-safety and incineration devices so as to eliminate any contamination.

Under the current phase of the project, where the task is to determine and optimize the conditions that BSF can be nurtured and the eggs can be hatched artificially, and to establish that human faeces can be effectively consumed by BSF larvae, the proposed set up shall be somewhat compromised so that it can be accommodated within the funding allowed. The list of the revised set up and their tentative cost is as follows:

Urine Diversion toilet- 3L; Refrigerated centrifuge- 4L; Temperature and moisture controlled enclosure: 4L; BSF hatching and farming facility- 6L; biosafety cabinets, clean room, incinerator, balance, -40 deg refrigerator, etc.- 6L

5. Organizational and Team Capacity to Execute Project (Please provide background on

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the Organizational and Team Capacity of the team proposed to execute the proposed project. Where appropriate, the following questions should be addressed as part of this section:.)

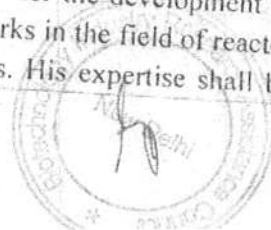
- Provide organizational capabilities of the applicant in relation to the proposed work.
- Details with respect to Facilities and Infrastructure available needs to be highlighted.
- Describe the capacity and expertise of the individual team members as they relate to the proposed workplan.
- Please outline the specific roles and activities of each collaborator which enable you to execute this project.
- Indicate areas where collaborators need to be identified and describe the role of the future collaborator (please note that preference will be given to projects which have identified the majority of collaborators)

The project team comprises of two different organizations. The major partner is Indian Institute of Technology Roorkee (IITR); the other partner is a Chennai-based commercial organization, Freshrooms Life Sciences (FLSc).

FLSc has been working with the BSF technology for the last few years and has been successful in mass production of BSF larvae which were used for conversion of organic waste into fish feed. They work in tandem with different small and medium scale industries to formulate fish- and animal-feeds suitable for respective businesses. FLSc shall provide IITR with initial seeds of BSFs and also supply other equipment and facilities required for rearing of BSF for undertaking the research work at IITR. Also, they shall help us in finding out the efficacy of final product (fish-feed) that will be developed in the laboratory at IITR as an outcome of the project. FLSc being a start-up and a knowledge-based company has a number of researchers in their advisory board and has been active in this field.

The major work in this project shall be carried out at IITR by a group of researchers belonging to different fields. The group consists of the following members: a) Dr S. Sarkar (PI), (SS) Environmental Engineering; b) Dr. Partha Roy (PR)- Animal Biotechnology; c) Dr. A. A. Kazmi (AAK)-Environmental Engineering; d) Dr. S. Dutta (SD) (Mechanical Engineering); e) Dr. P. K. Biswas (PKB)- Chemical Engineering and f) Ar. U. K. Roy (UKR) (Architecture, Planning and Design). The group members are active in their own fields of research. SS teaches wastewater engineering in IITR and has vast experience in research and field work related to the development of appropriate technology for rural areas, in the field of drinking water. He also has rich industrial experience dealing with water and wastewater treatment. PR has been working in the field of animal biotechnology for several years. He has been active in research the environmental field, especially with endocrine disruptor chemicals and their effect on biota. AAK is well known for his research work in the field of biological treatment of wastewater and municipal solid waste, and specializes in anaerobic treatment of wastewater. SD primarily works in the field of micro-channel flow phenomenon; he has previously worked in HVAC systems. He can be a great contributor for the development of innovative flushing arrangements for the improvised toilets. PKB works in the field of reactor engineering, bio-fuels, bio-energy and selective oxidation processes. His expertise shall be

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much required for many different aspects of the proposed research work. UKR has been active in urban planning and affordable housing. As a designer, his expertise shall be required for designing of improvised toilet with high level of comfort to the users. Although some of them did not have any direct opportunity to work in the particular field of sanitation, but their fields of expertise align quite close to the specific areas of the work that need to be pursued in this research work. Being the one of the topmost engineering institution in India, IITR has a constant supply of motivated and brilliant students, some of whom will be working in this project. We are planning to induct regular research assistants, associates as well as undergraduate students in summer research internships. In the present project phase, the persons to be involved with the project are a) Dr. S. Sarkar; b) Prof. P. Roy; c) Prof. A. A. Kazmi and d) Mr. U. K. Roy.

IITR boasts of having almost all the sophisticated instruments and equipment needed to carry out world-class research. Apart from Individual departmental laboratories having regular instruments and equipment, there is a centralized Instrumentation Center where there are sophisticated instrumentation facilities available, to name a few, Atomic Absorption Spectrophotometer (AAS), Electron Probe Micro Analyzer (EPMA), Scanning Electron Microscope (SEM), FE-SEM, Fluorescence Lifetime System (FLS), ICP- Mass Spectrometer (ICPMS-LA), Transmission Electron Microscopy (TEM), TG-DTA, etc.

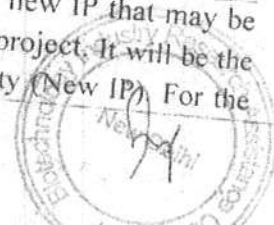
Within the Department of Civil Engineering, we have a dedicated solid waste management laboratory consisting of about 1000 sq ft of floor area and about 2000 sq ft of open area for housing outdoor structures. We plan to carry out the proposed research work in this laboratory. For this purpose, we shall retrofit this laboratory with necessary bio-safety facilities. Inside IITR we have enough places where we can install UDTs wherefrom source separated excreta can be collected and brought to the laboratory. Adjacent to this laboratory, we have an environmental engineering laboratory where several instruments are located, such as IC, GC-MS, AAS, etc. Another solid waste facility has composting yard and a rotary drum composter which shall be useful in this project. We have a well developed Biotechnology department where there are various sophisticated facilities required for work relevant to the project needs. We also enjoy almost uninterrupted power supply on the campus. Overall, the general facilities and infrastructure are enough to carry out the proposed research work. However, due to frequent requirements, we need to have some dedicated equipment and instruments a list of which has been indicated in the previous section.

**6. IP Status**

- Details on any relevant patent information or background IP issues
- Details on any freedom to operate issues
- Describe any new types of intellectual property that can be anticipated including how the identifications of these inventions will be managed.
- Describe overall project management emphasising the communication strategies, data management and data sharing and IP across collaborators
- Please indicate if there are any Intellectual property issues or restrictions arising from Material Transfer Agreements among collaborators

There is no background IP or any issues related with the same. Any new IP that may be arising out of the project, shall belong to the partners executing the project. It will be the responsibility of IITR and FLSc to protect the New Intellectual Property (New IP). For the

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purpose of this Project, New IP means intellectual property generated during the conduct of the project IITR and FLSc, but excluding the intellectual property generated before the execution of this project and any IP generated outside the scope of this Project even during the term of this Contract. New IP shall be governed in accordance with the GCI guidelines and such specific IP governance framework agreed to between the parties and the funding agency. It is accepted that the principles of Global Access provided below shall be maintained. The New IP will not be assigned or transferred to any third party directly or indirectly without prior written consent from BIRAC. Global Access means: a) the knowledge and information gained from the Project will be promptly and broadly disseminated and b) the funded development is made available and accessible at an affordable price to people most in need within developing country. An MoU has been executed between the project partners in this regard

7.	Financial	Details
- Expected other source of financial contribution in the proposal.		Details of other source of funding received/ requested/ committed for the proposed study (please include national, International, Government, Venture or angel funding)
- Details of investments made if any in the project so far		Details of funding taken through BMGF, BIRAC, DBT, USAID by the applicant
- Funding received so far/ approved from any agencies for conducting activities during the last five years (enlist project title, amount sanctioned, funding mode/ agency, and status of project)		
We have not applied for any other funding nor do we have any existing funding for this project.		

**SPECIFIC PROJECT PLAN AND DELIVERABLES**

SPECIFIC PROJECT PLAN AND DELIVERABLES			
Objectives	Methodology/Experimental Design	Alternate Strategies	Process Indicators for Measuring Success
To observe and determine the effect of type of substrates containing human faeces and different environmental conditions on the life-cycle of black soldier fly in and out of the substrates.	BSF larvae shall be grown on different types of substrates mixed with human faeces collected from urine diverting toilets. Different environmental conditions shall be provided to find out their effect on its life-cycle in and out of the substrates	None	Data on different life cycle events of BSF at different conditions.
To study and optimize the process of artificial mating	Our collaborator shall supply	None	Data on

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of the flies and mass hatching of eggs under different conditions.	necessary equipment and impart initial training on the BSF farming. We shall develop a temperature controlled enclosure where the work of artificial mating and egg-hatching shall be done		optimum conditions to be kept for mating of flies and hatching of eggs.
To study the kinetics of the growth of BSFL and their waste conversion rate on different types of substrate; this includes human faeces with varied proportions of organic waste.	The study shall be taken in conjunction of work to be done to achieve the first objective.	None	Data on growth kinetics of larvae on different substrates.
To prepare Indian and Global technology landscape analysis report for the use of black soldier fly larvae for the treatment of human waste.	Literature survey and visit to places where similar work is being done.	None	Report on Indian and Global scenario
To perform market research for the use of larvae by-products.	Literature survey	None	Report

**OBJECTIVE WISE ACTIVITIES & TIMELINES**

To observe and determine the effect of type of substrates containing human faeces and different environmental conditions on the life-cycle of black soldier fly in and out of the substrates.

Activities	Month Of Start Of Activity	Month Of End Of Activity	Deliverables	Name of team member/collaborator responsible for completing the activity
Procurement, construction and establishment of facilities like UDT, equipment/instrument, BSF rearing and hatching facilities, etc.	0	3	Facilities mentioned	as FISC and SS, PR, AAK, UKR
observing growth of BSF Larvae on different	4	16	Data on the growth	SS, PR, AAK

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substrates containing human faeces

To study and optimize the process of artificial mating of the flies and mass hatching of eggs under different controlled conditions.

Activities	Month Of Start Of Activity	Month Of End Of Activity	Deliverables	Name of team member/collaborator responsible for completing the activity
Setting up infrastructural facilities for BSF rearing and hatching	0	3	Facilities	FISc and SS, PR, AAK, UKR
Study the artificial mating and hatching procedure for BSF eggs	4	12	Data and report on the optimization of mating and hatching procedure	SS, PR

To study the kinetics of the growth of BSFL and their waste conversion rate on different types of substrate; this includes human faeces with varied proportions of organic waste.

Activities	Month Of Start Of Activity	Month Of End Of Activity	Deliverables	Name of team member/collaborator responsible for completing the activity
Setting up of the infrastructural facilities for examining the BSFL growth over different types of substrates	0	3	Facilities	SS, AAK, PR
Study of the kinetics of growth of BSFL on different substrates including human waste and	4	16	Data and report	SS, PR

To prepare Indian and Global technology landscape analysis report for the use of black soldier fly larvae for the treatment of human waste.

Activities	Month Of Start Of Activity	Month Of End Of Activity	Deliverables	Name of team member/collaborator responsible for

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Literature survey	3	16	Report	completing the activity
Travel to different laboratories/facilities	6	16	Report	SS, AAK, PR
<b>To perform market research for the use of larvae by-products.</b>				
Activities	Month Of Start Activity	Month Of End Activity	Deliverables	Name of team member/collaborator responsible for completing the activity
Proximate analysis of mature BSFL feeding on 6 different substrates	6	18	Data	SS, PR
Market research on the possible by-products identified through proximate analysis	6	18	Data and report	SS, PR

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Annexure 2

PERIODIC PAYMENT ARRANGEMENTS OF THE PROJECT COST

The Project Cost details as agreed shall be annexed giving detailed Break-up Year wise and Head wise clearly depicting the milestones, timelines and corresponding budget)

Budget Details:

S. No.	Items	Amount (Rs. in Lakhs)
1.	Capital cost in terms of equipment and accessories	23.00
2.	Manpower cost	8.00
3.	Consumable cost	5.00
4.	Travel	5.00
5.	Contingency	2.00
6.	Outsourcing cost	2.00
7.	Operational cost of the services provided by affiliated organization/ host institute/ incubation center	2.20
8.	Turnkey assistance for the project by the collaborator for establishment of the facilities and equipments	4.00
	<b>Total Project Cost</b>	<b>51.20</b>

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**A. Indian Component: Instalment-wise disbursement of fund-**

**1. Lead Organization, Indian Institute of Technology, Roorkee**

Instalments	Technical Milestones	Time-line (in months)	Amount (Rs. in Lakhs)
1 <sup>st</sup> (30%)	<ul style="list-style-type: none"> <li>Execution of agreement by all the Parties and acceptance of invoices raised separately by the Project Cost Recipients</li> </ul>	0	15.36
2 <sup>nd</sup> (20%)	<ul style="list-style-type: none"> <li>Procurement, construction and establishment of facilities like UDT, equipment/instrument, BSF rearing and hatching facilities, etc.</li> <li>Acceptance of invoices raised separately by the Project cost recipients</li> </ul>	3	10.24
3 <sup>rd</sup> (20%)	<ul style="list-style-type: none"> <li>Studies on Mating of BS flies and hatching of eggs (complete)</li> <li>Kinetics of growth of BSFL started</li> <li>Acceptance of invoices raised separately by the Project cost recipients</li> </ul>	12	10.24
4 <sup>th</sup> (20%)	<ul style="list-style-type: none"> <li>Proximate analysis of BSFL for identifying by products; data collection from other groups on BSFL; market research for byproducts</li> <li>Acceptance of invoices raised separately by the Project cost recipients</li> </ul>	17	10.24
5 <sup>th</sup> (10%)	<ul style="list-style-type: none"> <li>Project completion report</li> <li>Acceptance of invoices raised separately by the Project cost recipients</li> </ul>	18	5.12
<b>Total Project Cost</b>			<b>51.20</b>

**Note:** Applicable service taxes with respect to Project cost recipients severally will be governed as per the Laws of India on such services rendered towards achievement of the technical milestones cited above.

Sudipti Saha



Cost Plus Fixed Term (CPFT) Contract for Research and Development (R&D) under  
the Grand Challenges Initiative India (GCI India)

To: The P  
From:

Annexure 3  
Intellectual Property (IP) generated by the Lead Organisation before execution of this  
Contract

Not Applicable

Sandipti Saha

